SECTION 04500 – MASONRY RESTORATION

PART 1 – GENERAL

1.1 – RELATED DOCUMENTS

A. Drawings, and general provisions of the Contract, including General and Supplementary Conditions and Division I Specification Section, apply to the work of this section.

B. The extent of work is shown on the drawings and keynotes.

C. Unit Prices: Additions and deletions from the quantities shown on the drawings shall be executed under Unit Prices. Obtain authorization of the Architect before proceeding with any additions under unit price work. The following work items are covered by unit costs:

04550 Unit price 1: Provide new marble lintel stone matching existing at basement level. Price /lintel

04550 Unit Price 2: Remove and rebuilt loose cracked and budging face brick areas (not adjacent to lintels), isolated areas located at horizontal steel. Price/sq ft.

1.2 – SUMMARY

A. This Section includes the following:

1. Clean all exterior masonry exposed in the final construction, refer to Section 04510 “Historic Masonry Cleaning”.
2. Cut out and repoint all masonry, including all side walls, arches, trim, panels, jambs, reveals, areaways, steps and platforms.
3. Remove existing and provide new galvanized steel lintels (outermost only) and flashing where shown, remove and rebuild masonry as required to accomplish this work to match existing condition. Extend removal to include brick beyond lintels and adjacent window jambs that is displaced, hollow, cracked or loose.
   a. Type I. Basement level – Condition in front of window lintel: marble at string course above window. Type I a, reset existing lintel stone; Type I b, provide new matching lintel stone.
   b. Type II. Second floor – Condition in front of window lintel: flemish bond brick masonry.
4. Rake out existing ,mortar over horizontal structural steel and provide sanded sealant joint carefully matched to the appearance of the mortar joints (width, color, profile) over existing embedded steel beam flanges. Two levels (above and below second floor windows), full perimeter.
5. Remove and reset/replace cracked or displaced brick at or adjacent to lintel repairs (1.02A 3.) or over structural steel (1.02A 4.).
6. Remove and reset north entry steps over new foundation.
7. Remove and reset marble north entry step jambs/plinth outboard of the columns.
8. Replace damaged marble masonry base courses at northeast corner.
9. Repair 2 cracked cast stone quoins at northeast corner.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 4 “Historic Masonry Cleaning for masonry cleaning.
2. Division 4 “Unit Masonry” for additional quality control requirements, which shall apply as if restated in full in this Section.
3. Division 5 “Miscellaneous Metals for replacement lintels.
4. Division 7 “Sheet Metal and Flashings” for sheet metal flashing at replacement lintels.

1.3 - INTENT

A. To provide a sound and watertight building shell utilizing repair methods and materials that are compatible with the physical characteristics of the existing materials and which visually blend with the surrounding materials when viewed from twenty (20) feet.

1.4 – QUALITY ASSURANCE

A. Masonry restoration specialist: Work shall be performed by a firm having not less than five years successful experience in comparable masonry restoration projects and employing personnel skilled in the processes and operations indicated and required.

B. Field – Constructed Mock – Ups: Prior to start of general masonry restoration, prepare the following mock – ups

on building surfaces where directed by Consultant. Obtain Architect’s acceptance of visual qualities before proceeding with the work. Mock – ups will be used to measure standard of workmanship, finish, texture, color and qualifications of workman. Repeat mock – up procedure as required until Architect’s acceptance is obtained. Protect and mark acceptable mock – ups, retain in undisturbed condition during construction to be used as a standard for judging completed work.

1. Brick lintel rebuilding and flashing: Complete sample in stages demonstrating lintel replacement, flashing and brick replacement to match existing.
2. Marble lintel rebuilding and flashing: Complete sample in stages demonstrating lintel replacement, flushing and marble replacement to match existing.
3. Repointing:
   a. Brick: One sample demonstrating cutting out of mortar joints. One sample for demonstrating the color of the mortar, tooling and finishing of the joints. Each sample shall be ten (10) square feet.
   b. Granite, marble and cast stone. For each material, each sample shall be ten lineal feet. One sample demonstrating cutting out of mortar joints. One sample for demonstrating the color of the mortar, tooling and finishing of the joints.
   c. Sealant at existing mortar joint: One sample ten (10) feet long with sanded finish.
4. Sanded sealant: Prepare sample in stages. Cut mortar along 5 lineal feet of mortar joint. Rake of to required depth along 2 feet. Provide backer rod along 3 feet, and install sealant and sand along 2 of the 3 feet. The intent of this repair is to exactly match the appearance of the adjoining repointed mortar joints.

C. Any joints that develop hairline cracking, become unbonded, are friable after seven day cure period, or are otherwise defective in the opinion of the Architect, shall be cut out and repointed at no cost to the Owner.

1.5 – SUBMITTALS

A. Samples: Submit prior to mock-up samples for inspection by the Architect of each type of brick, lime,

cement, aggregate, grout, adhesive, patching material, sealant, flashing, and colorant proposed for use. Provide unopened container of each material with manufacturer’s original labeling. Also submit samples of each type of attachment anchor proposed for use.

1. All brick for repairs shall be existing undamaged brick or brick salvaged for the portions of the

building to be demolished.

B. Product data: Submit manufacturers' technical data and Materials Safety Data Sheet for each product specified or proposed for use including recommendations for their application and use.

C. Field Measurements: The Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.

1.6 – DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers. Store materials only in designated areas.

B. Protect materials during storage and construction. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage. Store material only in area designated by the Owner.

C. Deliver materials at such time as to assure continuity of installation. Store and handle units at project site or staging area with care to prevent chipping, cracking, distortion, warping, staining, or other damage.

1.7 – PROJECT CONDITIONS

A. Environmental requirements: Masonry rebuilding, repointing and patching may be carried out only when air temperatures are 45F and above and will remain 40F for not less than 14 days after completion of work.

B. Prevent mortar, coatings from staining surrounding masonry. Remove any spill immediately. Protect sills, ledges and other projections from mortar droppings by coating with sand. No spills shall be permitted to remain at the end of each work day.

C. Protect all new mortar from contract with rain for 24 hours. Cover work at end of each day and whenever work is not in progress. Extend waterproof covers securely over work area.

D. Protect persons, motor vehicles, all building surfaces including but not limited to roofing and flashing, walls,

parapets, and doors and related fixtures, signs, light standards, all metals, fittings and equipment of the building and building site, sidewalks, landscaping, and related materials from damage. Protect landscaping at this building and site.

1. In the event of damage, make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

F. Shore as required to complete the work and protect all masonry to remain. Removal and rebuilding shall be done in limited sections so as not to compromise in any way the structural stability of the building. Provide temporary watertight protection to all open work areas. Contractor shall provide a work plan

detailing the staging of the work and other measures to protect the building and adjacent areas.

1.8 – SEQUENCING/SCHEDULING

A. Perform masonry restoration work in the following sequence in any give location:

1. Clean masonry.
2. Remove masonry, install new lintels and flashings, and rebuild masonry.
3. Rebuild areas of cracked and displaced masonry.

4. Perform additional repairs including repointing, patching and paint removal.

1.9 – GUARANTEE

A. Provide written warranty ensuring that all replacement masonry units, patching materials, rebuilt work, sealants and mortar joints that are determined to become displaced, cracked, spalled, hairlined, delaminated, discolored or otherwise unacceptable within a period of two (2) years from the date of substantial completion will be replaced in a manner conforming with the requirements of this specification.

PART 2 – PRODUCTS

2.1 – MORTAR MATERIALS

A. Portland Cement, Type I ASTM C 150, Portland Cement. Cement shall comply with ASTM C 91, not more than 0.30 % water soluble alkali.

B. Hydrated Type S Lime for Masonry Purposes, ASTM C 207. Air entrained lime shall not be used.

C. Mortar Aggregate: Well-graded sharp bagged mason's mortar sand, ASTM C 144.

D. Water shall be clean and free from deleterious materials. Only potable water may be used.

E. Mortar Pigments. Iron oxide pigments manufactured by SGS (Solomon Grind Chem.). Color 10 H Light Buff.

1. Pigments to match color of the original mortar. Measurements of pigments shall be accurate and record shall be made of exact amount of pigment added to each approved mix.

F. Matching new construction: Mortar used to repoint existing building to remain shall be of the same composition, joint detail and appearance and face mortar used in the new construction specified under Section 04200 "Unit Masonry". Provide Type N mortar for all repointing and repairs.

2.2 – MASONRY UNITS

A. Brick: Salvage form the existing building section to be demolished only.

B. Marble: White Vermont Marble to match existing with respect to size, profiles, finish, color and veining.

2.3 – SEALANT

A. One – part polyurethane. Tremco Dymonic or equal meeting the requirements of Section 7900, color to be selected by Architect from manufacturer's standard color range. Coat exposed sealant at masonry joints with mortar sand before sealant sets.

B. Primers as recommended by manufacturer of sealant.

C. Closed cell polyethylene backer rod of sizes required to allow for a secure fit without over compression.

2.4 – WINDOW LINTELS, FLASHING AND ASSOCIATED MATERIALS

A. Conform to all requirements of Sections referenced in Part I of this Section.

2.5 – CLEANERS

A. Excess mortar remover: Sureklean 101, SureKlean Vanitrol – ProSoCo; NMD80 – EaCo Chem; Hydroclean 455 – Hydrochemical Techniques.

B. Restoration Cleaning: Refer to Section 04510 for masonry restoration cleaners.

2.6 – CAST STONE REPAIR

A. Jahn M 70 Stone Patching Mortar, color and texture to match cleaned sample of existing.

PART 3 – EXECUTION

3.1 – INSPECTION AND ACCEPTANCE

A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation. Commencement of work will be construed as complete acceptance of working conditions.

3.2 – MASONRY REPOINTING

A. Joint preparation.

I. All mortar in the work area shall be cut back to a depth of at least ¾", 2 and one half times the width of the joint or to sound mortar, whichever is greater. Care must be taken to avoid damage to the masonry units and to prevent widening of joints. Back of the joint shall be cut square. Remove any sealants , tar or other non-mortar joint filler; remove all trace of sealant, tar, etc. to assure bond. All loose material shall be washed from the joints using a hose. Joints shall be wetted before the new mortar is applied.

B. Mortar preparation and mixing.

I. The lime, cement and sand should be carefully measured and well mixed together dry. Any pigment should be added in measured quantities and well dispersed into the other materials. Mortar shall be mixed in small batches so that it will be used within one hour after preparation.

C. Mortar proportions for repointing and rebuilding/resetting shall be ASTM C 270 Type N mortar by proportion specification.

1. Mortar proportions: Provide ASTM C 270 Type N mortar by proportion specification:

1 Part by volume Portland Cement
1 Parts by volume Lime
6 Parts by volume sand, as measured damp. If dry sand is used, compensate volume for expansion

of damp sand.

D. Joint filling. Mortar should be packed in thin layers, not exceeding ½". Compact and allow each layer to become thumbprint hard before installation of new lift. Filled joints should be tooled to match the original joint profile. No mortar shall extend onto the face of the units.

E. Damp Cure mortar. Mist mortar for at least 4 hours after tooling. In windy or hot weather, review cure procedures with the Architect to ensure that mortar does not cure excessively fast.

F. Clean-up excess mortar at all areas repointed or rebuilt. Excess mortar should be removed from the surface before it sets using a bristle brush or by rubbing the surface with burlap or clean sand. Dried mortar shall be removed with chemical mortar remover.

3.03 – LINTEL REPLACEMENT AND REBUILDING

A. Remove masonry as required to replace lintel and to provide adequate bearing for new work. Extend removal area to include all cracked brick adjoining end of lintel.

B. Install replacement lintels and flashing per drawings.

C. Replace brickwork, fully replicating original coursing, joint pattern and layout. Coursing pattern to match and blend with the surrounding existing masonry. Maintain overall dimension, joint sizes and joint alignments.

D. Lay masonry units in full beds of mortar. Fill all bed, head and collar joints. Pre wet back-up bricks prior to laying to insure that the units are saturated, but without standing water on the surface.

3.04 – MORTAR REPLACEMENT WITH SEALANT OVER EMBEDDED STEEL

A. Cut of mortar joint along existing crack to a depth of 1 ½" using a single blade diamond saw along the midline of the joint. Existing crack "jumps courses" in some locations because the steel is located behind the brick, not at the joint line. Extend cut along the full perimeter, extending from the location of the end of the cracked area.

B. Cleanly remove mortar to a depth of ½" deep providing a square back.

C. Install backer rod and fill joint with sealant, tool sealant to match mortar joint detail.

D. Before sealant skins over, broadcast mortar sand to cover joint surface.

3.05 – ADDITIONAL REPAIR

A. Cracked and displaced brick: Where shown on the drawings, remove and replace cracked and displaced brick. Reset all areas where loose bricks are uncovered during repointing operations. Finish tool all rebuilt work to match original joint detail and to blend fully with adjoining areas.

B. Patch materials spalls and cracks in caat stone quoins at northeast corner to match original profiles.

END OF SECTION 04500

SECTION 4510 – MASONRY CLEANING

PART 1 – GENERAL

1.1 – RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to work of this section.

1.2 – SUMMARY

A. This section includes the following:

1. Providing all manpower, equipment, protection and materials necessary to complete the Work. The extent of Work includes:

    a. Cleaning all the masonry, including brick, marble, granite and cast stone to remain from grade up to the level of the cornice as shown and noted on the drawings. Clean all exposed brick at the interior of the areaways from the bottom up to and including the coping stones. Clean all granite steps, jambs and platforms.

2. Completing field mock-ups for review by the Architect and the Owner's Representative. Repeat tests as necessary until mock-ups are approved by the Preservation Consultant and Owner's Representative. Mock-ups shall be conducted in the presence of the Architect; provide 72 hours notice to schedule mock-ups.

    a. Preliminary tests for cleaning surfaces have been run. The results of these tests are for guidance only, larger scale tests, or tests under different temperature conditions require that concentrations be changed from those that appeared acceptable in the preliminary test. Preliminary tests were run at the east elevation. Description of preferred test area:

    Proprietary masonry cleaning material: Sabrestore, manufactured by EaCo chem..Inc., Forestville, PA 16035. The recommended dilution based on the tests is one (1) part Sabrestore diluted with three (3) parts water. Sabrestore is suitable to apply to all of the masonry types present on this project (marble, precast, granite, brick).

    Application: The Sabrestore were applied to a prewetted wall. The chemical was brush applied to the wall with light scrubbing and allowed at 20 minute dwell time following by reapplication. It was then pressure rinsed about five minutes after the second application. The rinsing was accomplished at 2500 psi (at pump) using a 15 degree spray tip.

B. Related Section: The following Sections contain requirements that relate to this Section.

1. Division 4 "Unit Masonry".
2. Division 4 " Historic Masonry Restoration" for masonry repair and restoration.

1.3 – QUALITY ASSURANCE

A. cleaning Specialist: Work shall be performed by a firm having not less than five years successful

experience in comparable masonry cleaning projects and employing personnel skilled in the processes and operations indicated and required.

B. Preconstruction Conference: A Preconstruction conference to be attended by the Architect, representatives of the Owner and all key personal of the contractor including project managers, field supervisors and foreman will be held prior to the start of work for the purpose of reviewing existing tests and samples, developing preliminary work scheduling, organizing the start of field-constructed mock-ups, reviewing access to power and water, storage of materials and equipment, protection of the building and site, protection of the public, adjoining buildings and vehicles, disposal of construction waste including water run-off from cleaning operations, the development of the Work Program submittal, and any other conditions of the work considered relevant by the Owner and the Architect.

1.4 – INTENT

A. To clean masonry surfaces using the gentlest materials and methods Which produce acceptable cleaning without damaging the substrate. It is understood that some "dirt" may not be cleaned by gentle materials and methods and, when approved by the Architect, shall remain after cleaning is complete. For each surface and soiling condition, use only the least aggressive methods or materials necessary to produce acceptable cleaning and uniform appearance.

1.5 – SUBMITTALS

A. Product Data: Submit manufacturers' technical data and Materials Safety Data Sheet for each product specified or proposed for use including recommendations for their application and use.

B. Field-Constructed Mock-Ups: Prior to start of general masonry cleaning, prepare the following mock-ups on building surfaces where directed by the Architect. Obtain Architect's acceptance of visual qualities before proceeding with the work. Protect and mark acceptable mock-ups, retain in undisturbed condition during construction to be used as a standard for judging completed work.

Demonstrate Contractor's quality control system to ensure uniform cleaning and appearance. Quality control must include application procedures, mixing and dilution control, and method of controlling distance between wall surfaces and water spray head. Demonstrate how pump pressures will be controlled and measured during the cleaning work.

Temperature variations may change the effectiveness of masonry cleaning chemicals and procedures. Retesting and additional cleaning mock-ups may be required if work is done at temperature varying by more than + 10F from those during approved test cleaning mock-ups. Production cleaning procedures will be adjusted if retesting shows that modification to procedures are required based on temperature changes.

1. Small Scale mock-ups shall consist of at least ten(10) square of brick and shall include at least one full stone of each additional masonry type.
2. After acceptance of small scale mock-ups contractor shall prepare a large mock-up which shall be from the second floor level to grade and one full window bay and pier wide. The large mock-up will be judged by overall cleanliness, visual qualities, surface characteristics and evenness of cleaning. The large mock-up will also be used to evaluate the adequateness of protective materials installation. Protective measures shall leave no residues on surfaces. Revise, repeat and adjust large mock-up until Architect's approval is obtained.

C. Material samples: Submit, for verification purposes, prior to mock-up, samples of the following: Each type of chemical cleaning material, full size containers of each, labeled and unopened to be inspected by the Architect at the site.

1.6 – REQUIREMENTS AND RESTRICTIONS

A. Deliver materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and manes of products and manufacturers.

B. Protect materials during storage and construction. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

C. No wire brushes or steel wool. Proprietary abrasive blasting (JOS or equal) may be allowed based on tests.

D. Protect persons, motor vehicles, grills, vents, street furniture, and related fixtures, all landscaping identified by the Owner during the Preconstruction conference, surrounding buildings, all signage, flagpoles, light poles, lighting fixtures, signals, grills, canopies, etc., and related materials from damage resulting from masonry cleaning work. Any surface or items damaged as a result of this Contract shall be restored to its Preconstruction condition at no additional cost to the owner.

Protect all intake vent and grills from water spray, fumes or chemicals.

E. Dispose of run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors, basements, or blockage of drains.

F. Do not perform chemical cleaning when wind will spread cleaning solutions to unprotected surfaces. Rinse all wall surfaces with unpressurized water to dilute chemicals prior to pressure rinsing to remove chemicals.

G. Clean masonry surfaces only when air temperatures are 45F and above and will remain 40F or above until masonry has dried out and for not less than 7 days after completion of cleaning.

H. All work shall be accomplished in conformance with all governing codes. Obtain all necessary permits/approvals form all agencies (City, State, Federal) having jurisdiction.

I. All areas surrounding the building shall be cleaned at the end of each work shift.

1.7 – SEQUENCING/SCHEDULING

A. Perform masonry cleaning in following sequence during each work phase (defined by areas):

1. Install and coordinate protection
2. Clean masonry surfaces.
3. Remove protective materials after work is complete in all adjoining areas. Provide final clean-up of all areas impacted by the work.

PART 2 – PRODUCTS

2.1 – CLEANING MATERIALS

A. Water: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.

B. Cleaner: Sabrestore, EaCo Chem. Inc. attn: Lynn Peden, Forestville, PA; local Rep: Len Anastasi, 781 334-9794; local Distributer: Paul Driscoll, 781 934-5138.

2.2 – RELATED EQUIPMENT

A. Brushes: Tampico fiber bristles.

B. Rinse water application: provide fan-shaped spray-tip which disperses water at angle of 15 degrees. Provide spray of 1000 psi at 3-4 gallons per minute. Hold gun not less than 8" from the wall.

C. Spray application: Hand pump garden-type sprayer, or special chemical resistant electric low pressure pump.

PART 3 – EXECUTION

3.1 – PREPARATION

A. Install protection for walkways and entries, window frames, sash, doors, signs, plaques, light fixtures, signs, canopies, gold leaf trim, flagpoles, statuary, mechanical and communications equipment for all chemical cleaners. Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products. Do not block mechanical exhausts or supplies or other utilities that must remain operative during cleaning operation. Liquid strippable masking agent, or polyethylene film and waterproof masking tape are acceptable for protecting glass. Apply masking agent to comply with manufacturer's recommendations.

3.2 – CLEANING

A. General: Clean surfaces strictly in accordance with approved cleaning tests and the descriptions below. Use materials, methods, and chemical concentrations approved for each surface.

Proceed with cleaning in an orderly manner; work from bottom to top each scaffold width and from one end of each elevation to the other. Divide the work into areas by set-back the elevation so that work can proceed in a systematic manner.

Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, reveals and interstices and which produces an even effect without streaking or damage to masonry surfaces.

B. Specific:

1. Apply Sabrestore at concentration determined by test to the surface. Apply to a dry surface starting at the bottom and proceeding upward. Allow a dwell time of 5 minutes. Reapply and rinse with unpressurized water to stop action of cleaning and to rinse most of the cleaner form

the wall. Note dwell time and application procedures may be modified as determined by tests.

2. Pressure rinse off chemical residue and soil by working downward from top to bottom of each treated area at each stage or scaffold setting. Protect completed areas from contact with cleaners. Hold spray nozzle not less than 8" from surface of masonry and apply water from side to side in overlapping bands to produce uniform coverage and an even effect.

END OF SECTION 04510